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was prepared primarily for the use of the students of the University of Pennsylvania, and was not placed on general sale, its use was greatly restricted. The present edition has been brought up to date, and its preparation was one of the last works of the author, the preface bearing the date 1897. Among the changes of interest, we note the inclusion of not only *Balanoglossus* but *Cephalodiscus* and *Rhabdopleura* in the chordates; the recognition of *Paleospondylus* and the *Astracopphri* as cyclostomes and the rehabilitation of the *Stegcephali*. The work will long remain a necessary assistant to every student who wishes to really study vertebrates. One may differ with the author upon minor points of his system, such as the retention of his groups *Rhachitomi* and *Embolomeri*; with the exclusively osteological basis of his classification, which, however, was a necessity in dealing with fossil forms, or with the outrageous forms, — carbonic, cumbric, etc., — adopted for the geological periods; but when all this fault is found there remains behind a work of which any one might be proud.

The introduction to the volume consists of a short sketch by Professor Osborn of the life and the works of Professor Cope, presenting in clear form the many advances both in knowledge of fact and in generalization which we owe to America's greatest comparative anatomist.

**Packard's Text-book of Entomology.**<sup>1</sup> — Professor Packard's new text-book of entomology appears at a most opportune time. The influence of the book because of the kind of entomology it illustrates and illumines will be very great and very valuable. As a reference and text-book of the morphology, physiology, and development of insects, it takes for these lines of study that position of authoritative and indispensable guide which *Comstock's Manual* takes for the study of the taxonomy and "life-history" of insects. With these two manuals of insect study, the English-speaking students of entomology are better provided with book guides than are the students of any other country.

Because there are hundreds of thousands of insect species, and because the finding and setting in order of species was the first business of naturalists, most entomologists have given most of their time to helping in this business of species finding and distributing.

<sup>1</sup> *A Text-book of Entomology, including the Anatomy, Physiology, Embryology, and Metamorphoses of Insects.* By A. S. Packard, M.D., Ph.D. The Macmillan Co., New York, 1898. 8°, pp. xvii, 729, with 654 figs. \$4.50.

The work is necessary and will never be abandoned. But while some of us have kept exclusively at this sort of work, others have begun to study insects from other points of view. What these others have done is pretty fairly set out in Dr. Packard's new book. From a knowledge of what has been done come the knowledge of what there is to do and the inspiration to do it. If this work done and to be done is an especially interesting and especially important kind of work, the pioneer text-book of such work is especially valuable and helpful. That the kind of entomology treated of in Dr. Packard's text-book is especially important and interesting will not be questioned in 1898 nor thereafter.

The author of such a text-book has a large undertaking on his hands, and one to which a great deal of time may be given. To decide on the quantity of matter to be included and the character of its treatment is a nice question, and opinions regarding it will most certainly vary. Dr. Packard is an entomologist widely acquainted with the work done by other entomologists and zoölogists, and especially capable, from his own wide range of study, to judge of the value of this work. He is in a position to write as an authoritative critic. We (if there are others of my way of thinking) should wish, then, to have him present in a text-book of entomology what seem to him, from his own investigations and from his knowledge of the observations and theories of others, the facts and theories accepted by the consensus of authority. We want a well-digested, clearly presented, authoritative statement of the present knowledge of insect morphology, physiology, and development. This, it seems to me, Dr. Packard has not wholly done. The author has wished to be very fair. He presents to us the original sources of his knowledge. He displays the contradicting observations and speculations of investigators; he quotes German and French writers in their own words and sometimes in their own language; he is strenuous to give credit to whom credit is due. This is delusive fairness. It is too much to expect, it is confusing, it is impossible for a text-book to give credit for all facts. It is impossible for Dr. Packard to give all the observations and theories pertinent to the structure and physiology of the Malpighian tubules or to the origin and development of the imaginal discs. But it is wholly possible for him to give us, regarding the Malpighian tubules and the imaginal discs, a statement of the present knowledge of these organs made by the man best fitted, probably, of all men in America to make an authoritative statement of such knowledge. This is one conception of what such a text-book from Dr. Packard should

be; and it probably is not Dr. Packard's; or if it is, he has not had the time to attempt such a complete digestion of the mass of observations and theories which he has had before him; and the matter of time is an influencing one in almost all work.

Dr. Packard's text-book need not be compared with similar ones in other languages, because there is no other one which at all approaches it in comprehensiveness or construction. Kolbe's *Einführung in der Kenntniss der Insekten* does not touch embryology nor post-embryonal development, nor hardly physiology; Camerano's *Anatomia degli Insetti* is insignificant; Lowne's *Blowfly* and Miall and Denny's *Cockroach* are of a different type, and one lacks authority while the other is old. Dr. Packard's is the one book covering the field of its subject, and it becomes at once the authoritative text.

It will be unnecessary to call attention to details of the book's construction. The logical arrangement and sequence of subjects, the wealth of illustration, the full lists of well-selected references, and the complete index are noticeably good features. The author is a veteran bookmaker and understands the importance of caring for the convenience of the book-user. The publishers have admirably aided the author in making the book usable, and have put it into substantial and pleasing form. The type-face is large and clean, and the "style" characteristically good.

The book is indispensable to teachers of entomology and zoölogy and to students of insect morphology and development. Whether it will be extensively used in "agricultural and technical schools and colleges," is a matter to be determined by time. There is no doubt that it ought to be so used, and cannot fail, in any case, to help better the opinion entertained by foreign scholars of American biology. Zoölogists and entomologists are under real obligations to Professor Packard for the material aid he has given them in writing the book.

STANFORD UNIVERSITY, CALIFORNIA.

VERNON L. KELLOGG.

**Faune de France.**<sup>1</sup>—This is a convenient handbook for the purpose of the determination of the insects of France. It treats of all of the orders of this class except the Coleoptera, which form the subject of an earlier volume. It consists entirely of analytical tables. These include all of the genera represented in France; and, except in the case of a few families, tables of species are also given. The

<sup>1</sup>Aclogue, A. *Faune de France*. Paris, J. B. Bailliere et Fils, 1897. 12mo, 516 pp., with 1235 figs. \$2.00.